

<b>REPORT DOCUMENTATION PAGE</b>			Form Approved OMB NO. 0704-0188		
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4. TITLE AND SUBTITLE Final Report: 2015 Laser Diagnostics in Combustion Gordon Research Conference and Gordon Research Seminar			5a. CONTRACT NUMBER W911NF-15-1-0209		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER 611102		
6. AUTHORS Dr. Mark Linne			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAMES AND ADDRESSES Gordon Research Conferences, Inc. 512 Liberty Lane  West Kingston, RI 02892 -1502			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211			10. SPONSOR/MONITOR'S ACRONYM(S) ARO		
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13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.					
14. ABSTRACT The Gordon Research Conference and Seminar on Laser Diagnostics in Combustion were held at Waterville Valley in Waterville Valley, New Hampshire from August 8-14, 2015. The Conference was well-attended with 182 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 182 attendees, 59 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 50 respondents, 80% were Caucasian, 20% Hispanic, 50% Asian and					
15. SUBJECT TERMS Final Report					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU			Mark Linne
					19b. TELEPHONE NUMBER 463-177-2836



## Report Title

Final Report: 2015 Laser Diagnostics in Combustion Gordon Research Conference and Gordon Research Seminar

### ABSTRACT

The Gordon Research Conference and Seminar on Laser Diagnostics in Combustion were held at Waterville Valley in Waterville Valley, New Hampshire from August 8-14, 2015. The Conference was well-attended with 182 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 182 attendees, 59 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 59 respondents, 8% were Minorities – 3% Hispanic, 5% Asian and 0% African American. Approximately 11% of the participants at the 2015 meeting were women.

The Seminar was well-attended with 48 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 48 attendees, 13 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 13 respondents, 8% were Minorities – 8% Hispanic, 0% Asian and 0% African American. Approximately 17% of the participants at the 2015 meeting were women.

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**Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:**

**(a) Papers published in peer-reviewed journals (N/A for none)**

Received

Paper

**TOTAL:**

**Number of Papers published in peer-reviewed journals:**

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**(b) Papers published in non-peer-reviewed journals (N/A for none)**

Received

Paper

**TOTAL:**

**Number of Papers published in non peer-reviewed journals:**

---

**(c) Presentations**

Number of Presentations: 0.00

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**Non Peer-Reviewed Conference Proceeding publications (other than abstracts):**

Received      Paper

**TOTAL:**

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

---

**Peer-Reviewed Conference Proceeding publications (other than abstracts):**

Received      Paper

**TOTAL:**

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

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**(d) Manuscripts**

Received      Paper

**TOTAL:**

Number of Manuscripts:

Books

Received      Book

TOTAL:

Received      Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

Graduate Students

<u>NAME</u>	<u>PERCENT_SUPPORTED</u>
FTE Equivalent:	
Total Number:	

Names of Post Doctorates

<u>NAME</u>	<u>PERCENT_SUPPORTED</u>
FTE Equivalent:	
Total Number:	

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### Names of Faculty Supported

NAME

PERCENT SUPPORTED

**FTE Equivalent:**

**Total Number:**

---

### Names of Under Graduate students supported

NAME

PERCENT SUPPORTED

**FTE Equivalent:**

**Total Number:**

---

### Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: ..... 0.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 0.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 0.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense ..... 0.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields: ..... 0.00

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### Names of Personnel receiving masters degrees

NAME

**Total Number:**

---

### Names of personnel receiving PHDs

NAME

**Total Number:**

---

### Names of other research staff

NAME

PERCENT SUPPORTED

**FTE Equivalent:**

**Total Number:**

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**Sub Contractors (DD882)**

**Inventions (DD882)**

**Scientific Progress**

**Technology Transfer**



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**Nancy Ryan Gray, Ph.D.**

President and Chief Executive Officer

## **GORDON RESEARCH CONFERENCES**

Laser Diagnostics in Combustion GRC/GRS– 2015

### **FINAL PROGRESS REPORT**

Army Research Office

Grant Number W911NF-15-1-0209

The Gordon Research Conference on Laser Diagnostics in Combustion was held at Waterville Valley in Waterville Valley, New Hampshire from August 9-14, 2015. The Conference was well-attended with 182 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 182 attendees, 59 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 59 respondents, 8% were Minorities – 3% Hispanic, 5% Asian and 0% African American. Approximately 11% of the participants at the 2015 meeting were women.

The Gordon Research Seminar on Laser Diagnostics in Combustion was held at Waterville Valley in Waterville Valley, New Hampshire from August 8-9, 2015. The Conference was well-attended with 48 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. Of the 48 attendees, 13 voluntarily responded to a general inquiry regarding ethnicity which appears on our registration forms. Of the 13 respondents, 8% were Minorities – 8% Hispanic, 0% Asian and 0% African American. Approximately 17% of the participants at the 2015 meeting were women.

In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. Attached is a copy of the formal schedule and speaker program and the poster program. In addition to these formal interactions, "free time" was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field.

Thank you for your support of this Conference. As you know, in the interest of promoting the presentation of unpublished and frontier-breaking research, Gordon Research Conferences does not permit publication of meeting proceedings. If you wish any further details, please feel free to contact me. Thank you.

Sincerely,

*Mark A Linne, Conference Chair*  
University of Edinburgh

*Julia Krueger, Seminar Chair*  
Synchrotron SOLEIL



*Gordon Research Conferences*  
**Laser Diagnostics in Combustion**  
Expanding the Limits in Space and Time

August 9-14, 2015  
Waterville Valley  
Waterville Valley, NH

Chair: **Mark A. Linne**  
Vice Chair: **Hope A. Michelsen**

## Contributors

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## Meeting Program

### Sunday

2:00 pm - 9:00 pm      Arrival and Check-in

6:00 pm                  Dinner

7:30 pm - 7:40 pm      Welcome / Introductory Comments by GRC Site Staff

7:40 pm - 9:30 pm      **Keynote Session: Mid-Infrared Spectroscopic Studies of Free**

## Radicals and Their Chemistry / Selected Poster Presentations

Discussion Leader: **Hope Michelsen** (Sandia National Laboratories, USA)

7:40 pm - 7:45 pm Introduction by Discussion Leader

7:45 pm - 8:25 pm **Grant Ritchie** (Oxford University, United Kingdom)

"Mid-Infrared Spectroscopic Studies of Free Radicals and Their Chemistry"

8:25 pm - 8:35 pm Discussion

8:35 pm - 8:45 pm Introduction by Discussion Leader

8:45 pm - 8:55 pm **Chloe Dedic** (Iowa State University, USA)

"Hybrid fs/ps Coherent Anti-Stokes Raman Scattering in Non-Equilibrium Environments"

8:55 pm - 9:00 pm Discussion

9:00 pm - 9:10 pm **Elin Malmqvist** (Lund University, Sweden)

"A Novel Laser-Radar Concept for Combustion Diagnostics"

9:10 pm - 9:15 pm Discussion

9:15 pm - 9:25 pm **Thomas Werblinski** (Institute of Engineering Thermodynamics, FAU Erlangen-Nürnberg, Germany)

"Development of a Supercontinuum-Based Absorption Spectrometer for High-Speed Multi-Scalar Combustion Diagnostics"

9:25 pm - 9:30 pm Discussion

## Monday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Time-Resolved Diagnostics for Reactive, Turbulent Flows**

Discussion Leader: **Brian Peterson** (University of Edinburgh, United Kingdom)

9:00 am - 9:10 am Introduction by Discussion Leader

9:10 am - 9:50 am **Isaac Boxx** (German Aerospace Center, Germany)

"High Bandwidth Laser Diagnostics for Turbulent Combustion: Moving from the Laboratory to the Test Rig"

9:50 am - 10:00 am Discussion

10:00 am - 10:30 am Group Photo / Coffee Break

10:30 am - 11:10 am **Carson Slabaugh** (Purdue University, USA)

"High-Speed Diagnostics in High-Pressure Gas Turbine Combustion Test Rigs"

11:10 am - 11:30 am Discussion

11:30 am - 12:10 pm **Benjamin Boehm** (Technical University Darmstadt, Germany)

"Turbulent Combustion: A Multi-Dimensional Problem"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch  
1:30 pm - 4:00 pm Free Time  
4:00 pm - 6:00 pm Poster Session  
6:00 pm Dinner

7:30 pm - 9:30 pm

### Coupling Between Modeling and Experiment

Discussion Leader: **Margaret Wooldridge** (University of Michigan, USA)

7:30 pm - 7:40 pm

Introduction by Discussion Leader

7:40 pm - 8:20 pm

**Heinz Pitsch** (RWTH Aachen University, Germany)

"How Can Data Lead to Models: Bringing Light to the Dark Arts"

8:20 pm - 8:35 pm

Discussion

8:35 pm - 9:15 pm

**Simone Hochgreb** (University of Cambridge, United Kingdom)

"Extracting Data from Turbulent Flames and Informing Models"

9:15 pm - 9:30 pm

Discussion

## Tuesday

7:30 am - 8:30 am

Breakfast

9:00 am - 12:30 pm

### Ultra-Short Pulse Nonlinear Interactions

Discussion Leader: **Johannes Kiefer** (University of Bremen, Germany)

9:00 am - 9:10 am

Introduction by Discussion Leader

9:10 am - 9:50 am

**Hans Stauffer** (Spectral Energies, LLC, USA)

"Ultra-Short Nonlinear Sensors: Exploiting Electronic Resonances"

9:50 am - 10:00 am

Discussion

10:00 am - 10:30 am

Coffee Break

10:30 am - 11:10 am

**Christopher Kiewer** (Sandia National Laboratories, USA)

"Recent Advances in CARS Imaging"

11:10 am - 11:30 am

Discussion

11:30 am - 12:10 pm

**Marcus Motzkus** (University of Heidelberg, Germany)

"Quantum Control Spectroscopy: Nonlinear Spectroscopy with Shaped Laser Pulses"

12:10 pm - 12:30 pm

Discussion

12:30 pm

Lunch

1:30 pm - 4:00 pm

Free Time

4:00 pm - 6:00 pm

Poster Session

6:00 pm

Dinner

7:30 pm - 9:30 pm

### Thermographic Phosphors in Flowfields

	Discussion Leader: <b>Marcus Alden</b> (Lund University, Sweden)
7:30 pm - 7:40 pm	Introduction by Discussion Leader
7:40 pm - 8:20 pm	<b>David Rothamer</b> (University of Wisconsin, USA) "High-Temperature Gas Measurements Using Thermographic Phosphors"
8:20 pm - 8:35 pm	Discussion
8:35 pm - 9:15 pm	<b>Frank Beyrau</b> (Universität Magdeburg, Germany) "Thermographic PIV: Use of Thermographic Phosphor Particles for Simultaneous Temperature and Velocity Imaging in Fluid Flows"
9:15 pm - 9:30 pm	Discussion

## Wednesday

7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<b>Sensing in Multiphase, Mixing, and Reacting Flows</b>
	Discussion Leader: <b>Caroline Genzale</b> (Georgia Institute of Technology, USA)
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:50 am	<b>Daniel Guildenbecher</b> (Sandia National Laboratories, USA) "Digital In-Line Holography (DIH) for 3D Quantification of Inert and Reacting Particle Fields"
9:50 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	<b>Christof Schulz</b> (University of Duisburg-Essen, Germany) "Understanding Tracer-LIF Under Engine-Relevant Conditions"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	<b>Mark Musculus</b> (Sandia National Laboratories, USA) "In-Cylinder Diagnostics for High-Pressure Combustion to Understand Fuel Efficiency and Pollutant Emissions"
12:10 pm - 12:30 pm	Discussion
12:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<u>Poster Session</u>
6:00 pm	Dinner
7:00 pm - 7:30 pm	<u>Business Meeting</u>
	<i>Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair</i>
7:30 pm - 9:30 pm	<b>Advances in Sources and Sensors</b>

Discussion Leader: **Jacqueline O'Connor** (Pennsylvania State University, USA)

7:30 pm - 7:40 pm Introduction by Discussion Leader

7:40 pm - 8:20 pm **James Gord** (Air Force Research Laboratory, USA)

"Pulse-Burst Laser Technology: Instrumentation and Applications"

8:20 pm - 8:35 pm Discussion

8:35 pm - 9:15 pm **Brian Thurow** (Auburn University, USA)

"3D Flow Visualization with Plenoptic Cameras"

9:15 pm - 9:30 pm Discussion

## Thursday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Soot Particle Detection**

Discussion Leader: **Stefan Will** (FAU Erlangen-Nürnberg, Germany)

9:00 am - 9:10 am Introduction by Discussion Leader

9:10 am - 9:50 am **Patrizia Minutolo** (Institute for Research on Combustion, CNR, Italy)

"Nucleation Particles in Premixed Flames: Optical Diagnostics and Environmental Issues"

9:50 am - 10:10 am Discussion

10:10 am - 10:40 am Coffee Break

10:40 am - 11:20 am **Graham Nathan** (University of Adelaide, Australia)

"Optical Diagnostics for Planar Imaging in Strongly Radiating Reacting Flows"

11:20 am - 11:30 am Discussion

11:30 am - 12:10 pm **Joshua Schwarz** (NOAA / Cooperative Institute for Research in Environmental Sciences, USA)

"Non-Pulsed LII Applied to Atmospheric Black Carbon Characterization in the Service of Climate Science"

12:10 pm - 12:30 pm Discussion

12:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm Dinner

7:30 pm - 9:30 pm **Novel Signal Processing**

Discussion Leader: **Edouard Berrocal** (Lund University, Sweden)

7:30 pm - 7:40 pm Introduction by Discussion Leader

7:40 pm - 8:20 pm **Christopher Goldenstein** (Stanford University, USA)

"Wavelength-Modulation Absorption-Spectroscopy Techniques for Measurements of Gas

Properties in Combustion Systems"

8:20 pm - 8:35 pm Discussion

8:35 pm - 9:15 pm **Elias Kristensson** (Lund University, Sweden)  
"Novel Laser Imaging Techniques Based on Structured Illumination"

9:15 pm - 9:30 pm Discussion

Friday

7:30 am - 8:30 am Breakfast

9:00 am Departure

*Gordon Research Seminar*  
**Laser Diagnostics in Combustion**

Challenges and Recent Developments in Laser-Based Combustion Diagnostics and Their Applications

August 8-9, 2015  
Waterville Valley  
Waterville Valley, NH

Chair: **Julia Krueger**  
Associate Chair: **Fahed J. Abou Nada**

## Contributors



**U.S. Army  
Research Office**



## Meeting Program

### Saturday

2:00 pm - 5:00 pm	Arrival and Check-in
3:30 pm - 3:45 pm	Introductory Comments by GRC Site Staff / Welcome by the GRS Conference Chair
3:45 pm - 4:30 pm	<b>Keynote Session: Challenges for Optical Diagnostics in Technical High-Pressure Combustion Systems</b>
	Discussion Leader: <b>Julia Krueger</b> (Synchrotron SOLEIL, France)
3:45 pm - 4:15 pm	<b>Volker Sick</b> (University of Michigan, USA) "Challenges for Optical Diagnostics in Technical High-Pressure Combustion Systems"
4:15 pm - 4:30 pm	Discussion
4:30 pm - 6:00 pm	<u>Poster Session</u>
6:00 pm	Dinner
7:30 pm - 9:30 pm	<b>Applied Diagnostics: Turbulent Flows and Time Resolved Spectroscopy</b>
	Discussion Leader: <b>Christoph Arndt</b> (German Aerospace Center (DLR), Germany)
7:30 pm - 7:50 pm	<b>Carl-Philipp Ding</b> (Technische Universität Darmstadt, Germany) "Piston Surface Temperatures During Flame Impingement in an Optically Accessible DISI Engine Using High-Speed Phosphor Thermometry and OH-LIF"
7:50 pm - 8:00 pm	Discussion

- 8:00 pm - 8:20 pm **Alexis Bohlin** (Sandia National Laboratories, USA)  
"Direct Coherent Raman Temperature Imaging and Wideband Chemical Detection in a Hydrocarbon Flat Flame"
- 8:20 pm - 8:30 pm Discussion
- 8:30 pm - 8:50 pm **Nicholas Neal** (University of Wisconsin Madison, USA)  
"Demonstration of High-Pressure OH PLIF Using the Direct 4th Harmonic Output of an Nd:YAG Laser"
- 8:50 pm - 9:00 pm Discussion
- 9:00 pm - 9:20 pm **Niels Goeran Blume** (High Temperature Process Diagnostics Research Group, Germany)  
"Supercontinuum Laser Broadband Absorption Spectroscopy for Combustion Research: Measurements and Evaluation of Recorded Spectra"
- 9:20 pm - 9:30 pm Discussion

## Sunday

- 7:30 am - 8:30 am Breakfast
- 9:00 am - 11:00 am **Advanced Laser Diagnostics**  
Discussion Leader: **Christopher Abram** (Universitat Magdeburg, Germany)
- 9:00 am - 9:20 am **Malin Jonsson** (Lund University, Sweden)  
"Time-Resolved Spectroscopic Study of Photofragment Fluorescence in Methane/Air Mixtures and Its Diagnostic Implications"
- 9:20 am - 9:30 am Discussion
- 9:30 am - 9:50 am **Kajsa Larsson** (Lund University, Sweden)  
"Single Shot Imaging of Hydrogen Peroxides in Premixed Flames Using Photofragmentation and Structured Illumination"
- 9:50 am - 10:00 am Discussion
- 10:00 am - 10:20 am **Dennis van der Voort** (Eindhoven University of Technology, The Netherlands)  
"Dispersion of Glowing Sprays"
- 10:20 am - 10:30 am Discussion
- 10:30 am - 10:50 am **Benoit Fond** (Imperial College London, United Kingdom)  
"Characterisation of Phosphor Particles for Thermographic PIV"
- 10:50 am - 11:00 am Discussion
- 11:00 am - 12:30 pm Poster Session  
*Coffee will be served in the poster area from 11:00 am - 11:30 am*
- 12:30 pm Lunch
- 1:30 pm - 2:30 pm **Soot Particles Diagnostics**



Discussion Leader: **Fahed Abou Nada** (Lund University, Sweden)

1:30 pm - 1:50 pm

**Gordon Humphries** (University of Strathclyde, United Kingdom)

"Novel Diode Laser Techniques for Trace Species and Particulate Measurement: *In Situ* cw-CRDS and Photoacoustic Soot Detection"

1:50 pm - 2:00 pm

Discussion

2:00 pm - 2:20 pm

**Dahe Gu** (University of Adelaide, Australia)

"Application of Two-Line Atomic Fluorescence in Sooting Flames Under Irradiation from a High-Flux Solar Simulator"

2:20 pm - 2:30 pm

Discussion

2:30 pm - 3:00 pm

Evaluation Period

*Fill in GRS Evaluation Forms*

3:00 pm

Seminar Concludes

**Laser Diagnostics in Combustion (2015)**

<b>Name</b>	<b>Organization</b>	<b>Participation</b>	<b>Status</b>
<b>Abou Nada, Fahed J</b>	Lund University	Poster Presenter	Registered
<b>Abram, Christopher M</b>	Universitat Magdeburg	Speaker	Registered
<b>Alden, Marcus</b>	Lund University	Discussion Leader	Registered
<b>Alquaity, Awad Bin Saud</b>	KAUST	Poster Presenter	Registered
<b>Alwahabi, Zeyad T</b>	University of Adelaide	Poster Presenter	Registered
<b>Andersson, Mats R</b>	Chalmers University of Technology	Poster Presenter	Registered
<b>Arndt, Christoph M</b>	German Aerospace Center (DLR)	Speaker	Registered
<b>Bakker, Peter Christian</b>	Eindhoven University of Technology	Poster Presenter	Registered
<b>Barlow, Robert S</b>	Sandia National Laboratories	Attendee	Registered
<b>Becker, Lukas G</b>	Technische Universität Darmstadt	Poster Presenter	Registered
<b>Bengtsson, Per-Erik</b>	Lund University	Poster Presenter	Registered
<b>Berrocal, Edouard</b>	Lund University	Discussion Leader	Registered
<b>Beyrau, Frank</b>	Universität Magdeburg	Speaker	Registered
<b>Blume, Niels Goeran</b>	High Temperature Process Diagnostics Research Group	Poster Presenter	Registered
<b>Bode, Johannes</b>	Technical University Darmstadt	Poster Presenter	Registered
<b>Boehm, Benjamin</b>	Technical University Darmstadt	Speaker	Registered
<b>Bohlin, Alexis</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Bood, Joakim</b>	Lund University	Poster Presenter	Registered
<b>Borggren, Jesper</b>	Lund University	Poster Presenter	Registered
<b>Boxx, Isaac G</b>	German Aerospace Center	Speaker	Registered
<b>Brockhinke, Andreas</b>	Bielefeld University	Poster Presenter	Registered

<b>Burns, Iain S</b>	University of Strathclyde	Poster Presenter	Registered
<b>Campbell, Matthew F</b>	Sandia National Laboratory	Poster Presenter	Registered
<b>Cantu, Luca</b>	The George Washington University	Attendee	Registered
<b>Carter, Campbell D</b>	Air Force Research Laboratory	Attendee	Registered
<b>Caswell, Andrew W</b>	Air Force Research Laboratory	Poster Presenter	Registered
<b>Cenker, Emre</b>	KAUST	Poster Presenter	Registered
<b>Cheskis, Sergey</b>	Tel Aviv University	Poster Presenter	Registered
<b>Chien, Yu-Chien</b>	University of California, Irvine	Attendee	Registered
<b>Chighine, Andrea</b>	University of Edinburgh	Poster Presenter	Registered
<b>Coriton, Bruno</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Cutler, Andrew D</b>	George Washington University	Poster Presenter	Registered
<b>Dam, Nico</b>	Technical University of Eindhoven	Poster Presenter	Registered
<b>Danehy, Paul M</b>	NASA Langley Research Center	Attendee	Registered
<b>Dedic, Chloe E</b>	Iowa State University	Speaker	Registered
<b>Dennis, Clareta N</b>	Naval Air Warfare Center Weapons Division	Poster Presenter	Registered
<b>Ding, Carl-Philipp</b>	Technische Universität Darmstadt	Poster Presenter	Registered
<b>Dreier, Thomas</b>	Univ. Duisburg-Essen	Poster Presenter	Registered
<b>Dreizler, Andreas</b>	Technische Universitaet Darmstadt	Poster Presenter	Registered
<b>Dunn-Rankin, Derek</b>	University of California, Irvine	Poster Presenter	Registered
<b>Ebert, Volker</b>	PTB Phys.Techn. Bundesanstalt	Poster Presenter	Registered
<b>Ehn, Andreas</b>	Lund University	Poster Presenter	Registered
<b>Endres, Torsten</b>	University of Duisburg-Essen	Poster	Registered

		Presenter	
<b>Escofet Martin, David</b>	UCI	Poster Presenter	Registered
<b>Ewart, Paul</b>	Oxford University	Poster Presenter	Registered
<b>Farooq, Aamir</b>	KAUST	Attendee	Registered
<b>Feeler, Ryan</b>	Northrop Grumman Cutting Edge Optronics	Poster Presenter	Registered
<b>Fond, Benoit</b>	Imperial College London	Poster Presenter	Registered
<b>Frank, Jonathan H</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Frattina, Valerio</b>	IFP-Energies Nouvelles	Poster Presenter	Registered
<b>Fuhrmann, Daniel</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Fukumasu, Newton K</b>	University of Sao Paulo	Poster Presenter	Registered
<b>Gallo, Emanuela</b>	GWU	Attendee	Registered
<b>Gao, Jinlong</b>	Lund University	Poster Presenter	Registered
<b>Gao, Yi</b>	University of Cambridge	Poster Presenter	Registered
<b>Geigle, Klaus Peter</b>	German Aerospace Center (DLR)	Poster Presenter	Registered
<b>Genzale, Caroline</b>	Georgia Institute of Technology	Discussion Leader	Registered
<b>Geyer, Dirk</b>	HDA Darmstadt	Attendee	Registered
<b>Giassi, Davide</b>	Yale University	Poster Presenter	Registered
<b>Goldenstein, Christopher S</b>	Stanford University	Speaker	Registered
<b>Gord, James R</b>	Air Force Research Laboratory	Speaker	Registered
<b>Gu, Dahe</b>	University of Adelaide	Poster Presenter	Registered
<b>Guildenbecher, Daniel R</b>	Sandia National Laboratories	Speaker	Registered
<b>Haller, Timothy W</b>	University of Texas at Austin	Poster Presenter	Registered

<b>Halls, Benjamin R</b>	National Research Council / Air Force Research Laboratory	Poster Presenter	Registered
<b>Hemdal, Stina</b>	Chalmers University of Technology	Poster Presenter	Registered
<b>Herzog, Joshua M</b>	University of Wisconsin	Poster Presenter	Registered
<b>Hochgreb, Simone</b>	University of Cambridge	Speaker	Registered
<b>Hoffmeister, Kathryn N. G.</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Hot, Dina</b>	Lund University	Poster Presenter	Registered
<b>Huber, Franz J.T.</b>	Institute of Engineering Thermodynamics, FAU Erlangen	Poster Presenter	Registered
<b>Humphries, Gordon</b>	University of Strathclyde	Speaker	Registered
<b>Jia, Hui</b>	National university of defense technology	Poster Presenter	Registered
<b>Jonsson, Malin Mp</b>	Lund University	Poster Presenter	Registered
<b>Kaiser, Sebastian A</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Kastengren, Alan</b>	Argonne National Laboratory	Poster Presenter	Registered
<b>KC, Utsav</b>	King Abdullah University of Science and Technology (KAUST)	Poster Presenter	Registered
<b>Kearney, Sean P</b>	Engineering Sciences Center	Attendee	Registered
<b>Kempema, Nathan J</b>	Yale University	Poster Presenter	Registered
<b>Kiefer, Johannes</b>	University of Bremen	Discussion Leader	Registered
<b>Kliewer, Christopher J</b>	Sandia National Laboratories	Speaker	Registered
<b>Koehler, Markus</b>	German Aerospace Center	Poster Presenter	Registered
<b>Kristensson, Elias</b>	Lund University	Speaker	Registered
<b>Krueger, Julia</b>	Synchrotron SOLEIL	Poster Presenter	Registered
<b>Kuehnreich, Benjamin</b>	Technische Universität Darmstadt	Poster Presenter	Registered
<b>Landry, Olivier</b>	Alpes Lasers SA	Poster	Registered

		Presenter	
<b>Langenkamp, Peter N</b>	University of Groningen	Poster Presenter	Registered
<b>Larsson, Kajsa</b>	Lund University	Poster Presenter	Registered
<b>Li, Xuesong</b>	University of Minnesota	Poster Presenter	Registered
<b>Lind, Susanne</b>	Institute of Engineering Thermodynamics, FAU Erlangen	Poster Presenter	Registered
<b>Linne, Mark A</b>	University of Edinburgh	Chair	Registered
<b>Liu, Xunchen</b>	Shanghai Jiao Tong University	Attendee	Registered
<b>Long, Marshall B</b>	Yale University	Poster Presenter	Registered
<b>Lucht, Robert P</b>	Purdue University	Poster Presenter	Registered
<b>Luers, Andrew S</b>	Oxford University	Poster Presenter	Registered
<b>Ma, Bin</b>	GE Global Research Center	Attendee	Registered
<b>Maes, Noud</b>	Eindhoven University of Technology	Poster Presenter	Registered
<b>Magnotti, Gaetano</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Malmqvist, Elin</b>	Lund University	Speaker	Registered
<b>Mansmann, Raphael</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Mazur, Marek</b>	CNRS laboratoire EM2C	Poster Presenter	Registered
<b>Meier, Wolfgang</b>	German Aerospace Center DLR	Poster Presenter	Registered
<b>Menser, Jan</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Meyer, Terrence</b>	Purdue University	Poster Presenter	Registered
<b>Michael, James B</b>	Iowa State University	Poster Presenter	Registered
<b>Michelsen, Hope A</b>	Sandia National Laboratories	Vice Chair	Registered
<b>Minutolo, Patrizia</b>	Institute for Research on Combustion, CNR	Speaker	Registered
<b>Mitrani, James</b>	PPPL	Poster	Registered

		Presenter	
<b>Motzkus, Marcus A</b>	University of Heidelberg	Speaker	Registered
<b>Musculus, Mark</b>	Sandia National Laboratories	Speaker	Registered
<b>Nathan, Graham</b>	University of Adelaide	Speaker	Registered
<b>Neal, Nicholas J</b>	University of Wisconsin Madison	Poster Presenter	Registered
<b>Nordstrom, Emil</b>	Lund University	Poster Presenter	Registered
<b>O'Connor, Jacqueline</b>	Pennsylvania State University	Discussion Leader	Registered
<b>O'Hagan, Seamus K</b>	University of Oxford	Poster Presenter	Registered
<b>Paciaroni, Megan E</b>	Fort Lewis College	Poster Presenter	Registered
<b>Pareja Restrepo, Jhon Alexander</b>	Technische Universitaet Darmstadt	Poster Presenter	Registered
<b>Patnaik, Anil K</b>	AFRL/ISSI	Poster Presenter	Registered
<b>Peterson, Kevin H</b>	General Motors Research And Development	Poster Presenter	Registered
<b>Peterson, Brian R</b>	University of Edinburgh	Discussion Leader	Registered
<b>Pitsch, Heinz</b>	RWTH Aachen University	Speaker	Registered
<b>Pitz, Robert W</b>	Vanderbilt University	Poster Presenter	Registered
<b>Rahm, Mattias</b>	Chalmers University of Technology	Poster Presenter	Registered
<b>Rankin, Brent A</b>	Air Force Research Laboratory	Poster Presenter	Registered
<b>Reising, Heath</b>	University of Texas at Austin	Poster Presenter	Registered
<b>Richardson, Daniel R</b>	Spectral Energies, LLC	Poster Presenter	Registered
<b>Richter, Mattias</b>	Lund University	Attendee	Registered
<b>Rieker, Gregory B</b>	University of Colorado-Boulder	Poster Presenter	Registered
<b>Rissmann, Martin</b>	TU Darmstadt	Poster Presenter	Registered

<b>Ritchie, Grant</b>	Oxford University	Speaker	Registered
<b>Rosell, Joakim</b>	Lund University	Poster Presenter	Registered
<b>Rothamer, David A</b>	University of Wisconsin	Speaker	Registered
<b>Roy, Sukesh</b>	Spectral Energies, LLC	Poster Presenter	Registered
<b>Saffaripour, Meghdad</b>	National Research Council Canada	Poster Presenter	Registered
<b>Sahlberg, Anna-Lena</b>	Lund University	Poster Presenter	Registered
<b>Samuelsson, Per G</b>	Lund University	Poster Presenter	Registered
<b>Sanchez-Gonzalez, Rodrigo</b>	Texas A&M University	Poster Presenter	Registered
<b>Sanders, Scott</b>	University of Wisconsin - Madison	Poster Presenter	Registered
<b>Scherman, Michael</b>	ONERA, The French Aerospace Lab	Poster Presenter	Registered
<b>Schneider, Florian</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Schneider, Silvan</b>	TU Darmstadt	Poster Presenter	Registered
<b>Schorr, Juergen</b>	Daimler AG	Poster Presenter	Registered
<b>Schroeder, Paul J</b>	University of Colorado Boulder	Poster Presenter	Registered
<b>Schulz, Christof W</b>	University of Duisburg-Essen	Speaker	Registered
<b>Schwarz, Joshua P</b>	NOAA / Cooperative Institute for Research in Environmental Sciences	Speaker	Registered
<b>Scouflaire, Philippe CI</b>	CNRS laboratoire EM2C	Poster Presenter	Registered
<b>Sedarsky, David</b>	Chalmers University	Poster Presenter	Registered
<b>Seeger, Thomas</b>	University of Siegen	Poster Presenter	Registered
<b>Shaddix, Christopher R</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Shimura, Masayasu</b>	Tokyo Institute of Technology	Poster	Registered



		Presenter	
<b>Sick, Volker</b>	University of Michigan	Poster Presenter	Registered
<b>Simonsson, Johan</b>	Lund University	Poster Presenter	Registered
<b>Sipkens, Timothy A</b>	University of Waterloo	Poster Presenter	Registered
<b>Slabaugh, Carson D</b>	Purdue University	Speaker	Registered
<b>Slipchenko, Mikhail N</b>	Spectral Energies, LLC	Poster Presenter	Registered
<b>Smallwood, Gregory J</b>	National Research Council Canada	Poster Presenter	Registered
<b>Stauffer, Hans U</b>	Spectral Energies, LLC	Speaker	Registered
<b>Steinberg, Adam</b>	University of Toronto	Poster Presenter	Registered
<b>Subash, Arman Ahamed</b>	Lund University	Poster Presenter	Registered
<b>Sun, Zhiwei</b>	University of Adelaide	Poster Presenter	Registered
<b>Thurrow, Brian</b>	Auburn University	Speaker	Registered
<b>Tibavinsky, Ivan A</b>	University of Michigan	Poster Presenter	Registered
<b>Tinker, Darren C</b>	Vanderbilt University - Mechanical Engineering	Poster Presenter	Registered
<b>Torben, Muller</b>	Daimler AG	Poster Presenter	Registered
<b>van der Voort, Dennis D.D.</b>	Eindhoven University of Technology	Poster Presenter	Registered
<b>Varghese, Philip L</b>	University of Texas at Austin	Poster Presenter	Registered
<b>Venkatesan, Krishna Kumar</b>	GE Research	Attendee	Registered
<b>Voges, Heinrich</b>	LaVision GmbH	Attendee	Registered
<b>Wagner, Steven L</b>	Technische Universitat Darmstadt	Poster Presenter	Registered
<b>Wang, Zhenkan</b>	Lund University	Poster Presenter	Registered
<b>Werblinski, Thomas</b>	Institute of Engineering Thermodynamics, FAU	Speaker	Registered

Erlangen-Nürnberg

<b>Will, Stefan</b>	FAU Erlangen-Nürnberg	Discussion Leader	Registered
<b>Williams, Benjamin A O</b>	Imperial College London	Poster Presenter	Registered
<b>Willman, Christopher</b>	University of Oxford	Poster Presenter	Registered
<b>Witkowski, Dustin R</b>	University of Wisconsin-Madison	Poster Presenter	Registered
<b>Wooldridge, Margaret S</b>	University of Michigan	Discussion Leader	Registered
<b>Wu, Yinghai</b>	CanmetENERGY-Ottawa	Attendee	Registered
<b>Zetterberg, Johan</b>	Lund University	Poster Presenter	Registered
<b>Zha, Kan</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Zhou, Jianfeng</b>	Lund University	Poster Presenter	Registered
<b>Zhu, Jiajian</b>	Lund University	Poster Presenter	Registered
<b>Zigan, Lars</b>	LTT Erlangen	Poster Presenter	Registered

182 Attendees

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**Laser Diagnostics in Combustion (GRS) (2015)**

<b>Name</b>	<b>Organization</b>	<b>Participation</b>	<b>Status</b>
<b>Abou Nada, Fahed J</b>	Lund University	Chair	Registered
<b>Abram, Christopher M</b>	Universitat Magdeburg	Discussion Leader	Registered
<b>Arndt, Christoph M</b>	German Aerospace Center (DLR)	Discussion Leader	Registered
<b>Bakker, Peter Christian</b>	Eindhoven University of Technology	Poster Presenter	Registered
<b>Blume, Niels Goeran</b>	High Temperature Process Diagnostics Research Group	Speaker	Registered
<b>Bohlin, Alexis</b>	Sandia National Laboratories	Speaker	Registered
<b>Borggren, Jesper</b>	Lund University	Poster Presenter	Registered
<b>Campbell, Matthew F</b>	Sandia National Laboratory	Poster Presenter	Registered
<b>Chien, Yu-Chien</b>	University of California, Irvine	Poster Presenter	Registered

<b>Ding, Carl-Philipp</b>	Technische Universität Darmstadt	Speaker	Registered
<b>Escofet Martin, David</b>	UCI	Poster Presenter	Registered
<b>Fond, Benoit</b>	Imperial College London	Speaker	Registered
<b>Frattina, Valerio</b>	IFP-Energies Nouvelles	Poster Presenter	Registered
<b>Fuhrmann, Daniel</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Fukumasu, Newton K</b>	University of Sao Paulo	Poster Presenter	Registered
<b>Giassi, Davide</b>	Yale University	Poster Presenter	Registered
<b>Gu, Dahe</b>	University of Adelaide	Speaker	Registered
<b>Haller, Timothy W</b>	University of Texas at Austin	Poster Presenter	Registered
<b>Halls, Benjamin R</b>	National Research Council / Air Force Research Laboratory	Poster Presenter	Registered
<b>Hot, Dina</b>	Lund University	Poster Presenter	Registered
<b>Humphries, Gordon</b>	University of Strathclyde	Speaker	Registered
<b>Jonsson, Malin Mp</b>	Lund University	Speaker	Registered
<b>Kempema, Nathan J</b>	Yale University	Poster Presenter	Registered
<b>Krueger, Julia</b>	Synchrotron SOLEIL	Chair	Registered
<b>Kuehnreich, Benjamin</b>	Technische Universität Darmstadt	Poster Presenter	Registered
<b>Langenkamp, Peter N</b>	University of Groningen	Poster Presenter	Registered
<b>Larsson, Kajsa</b>	Lund University	Speaker	Registered
<b>Linne, Mark A</b>	University of Edinburgh	Poster Presenter	Registered
<b>Maes, Noud</b>	Eindhoven University of Technology	Poster Presenter	Registered
<b>Malmqvist, Elin</b>	Lund University	Poster Presenter	Registered
<b>Michelsen, Hope A</b>	Sandia National Laboratories	Poster Presenter	Registered
<b>Neal, Nicholas J</b>	University of Wisconsin Madison	Speaker	Registered
<b>O'Hagan, Seamus K</b>	University of Oxford	Poster Presenter	Registered
<b>Pareja Restrepo, Jhon Alexander</b>	Technische Universitaet Darmstadt	Poster Presenter	Registered
<b>Reising, Heath</b>	University of Texas at Austin	Poster Presenter	Registered
<b>Rissmann, Martin</b>	TU Darmstadt	Poster Presenter	Registered
<b>Saffaripour, Meghdad</b>	National Research Council Canada	Poster Presenter	Registered
<b>Sahlberg, Anna-Lena</b>	Lund University	Poster Presenter	Registered
<b>Schneider, Florian</b>	University of Duisburg-Essen	Poster Presenter	Registered
<b>Sick, Volker</b>	University of Michigan	Speaker	Registered
<b>Simonsson, Johan</b>	Lund University	Poster Presenter	Registered
<b>Subash, Arman Ahamed</b>	Lund University	Poster Presenter	Registered

<b>Tibavinsky, Ivan A</b>	University of Michigan	Poster Presenter	Registered
<b>Tinker, Darren C</b>	Vanderbilt University - Mechanical Engineering	Poster Presenter	Registered
<b>van der Voort, Dennis D.D.</b>	Eindhoven University of Technology	Speaker	Registered
<b>Willman, Christopher</b>	University of Oxford	Poster Presenter	Registered
<b>Witkowski, Dustin R</b>	University of Wisconsin-Madison	Poster Presenter	Registered
<b>Zhou, Jianfeng</b>	Lund University	Poster Presenter	Registered

**48 Attendees**